DUT-E SAU

FUEL SUPPLY AUTOMATION UNIT

DUT-E SAU 12/24

OPERATION MANUAL

Version 1.0

S6 IoT BURGER

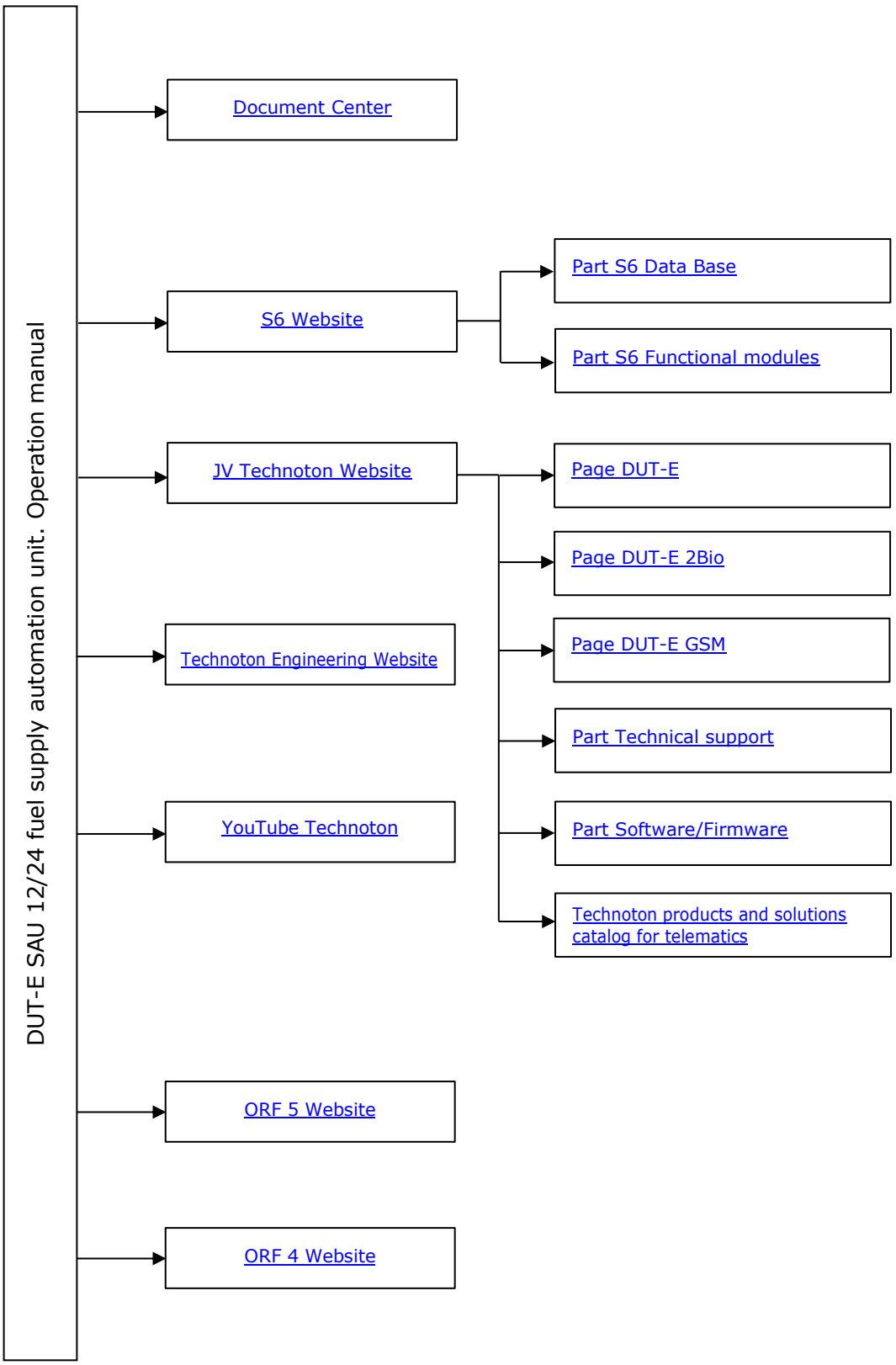
TECHNOTON
ADVANCED MACHINERY TELEMATICS

Contents

Revision history

Version	Date	Editor	Description of changes
1.0	08.2023	OD	Basic version

Structure of external links



Terms and Definitions

IoT Burger is the Technology of creating smart sensors and complex telematics IIoT devices operating in real time with built-in analytic features (further on – IoT Burger). The basis of IoT Burger is the software/hardware core, a set of ready-to-use universal Functional Modules, the database of standartized IoT parameters.

Particular features of IoT Burger:

- inbuilt analytic features for maximum treatment of signals within the device itself;
- a possibility to design devices with extremely low power consumption;
- doesn't require programming in the majority of applications, flexible setup;
- using inexpensive industrially manufactured equipment parts;
- measurement and treatment of "quick" processes which is impossible to implement using cloud technologies;
- an option of ready Reports delivery to the user avoiding server platforms;
- the inbuilt system of data authenticity assurance (self-diagnostics, authorization, impact control).

The technology provides for the availability of several measurement channels in any device including pre-set analytical treatment (filtration, linearization, thermal compensation) and the controlled error of measurement.

Devices created using IoT Burger may be united to form a wire-connected or wireless connection network. Data may be transmitted to the telematics server, to popular IoT platforms, by SMS, E-mail, to social networks.

At present, 2G/3G/LTE/NB-IoT/Wi-Fi/BLE data transmission standards are used in devices with IoT Burger. The reports transmitted contain data on instant and average values of Parameters, Counters, Events. The flexible system of Reports setup enables the user to select the optimal ratio of the data completeness and the volume of traffic.

DUT-E SAU Fuel supply automation unit is developed based on IoT Burger Technology.

S6 — technology of combining smart sensors and other IoT devices within one wire network for monitoring of complex stationary and mobile objects: vehicles, locomotives, smart homes, technological equipment etc. The technology is based and expands SAE j1939 automotive standards.

Information on cabling system, service adapter and S6 software refer to CAN j1939/S6 Operation manual.

DUT-E SAU Fuel supply automation unit complies with S6 Technology.

PGN (Parameter Group Number) — is a combined group of S6 parameters, which has common name and number. Functional modules (FM) of the Unit can have input/output PGNs and setup PGNs.

SPN (Suspect Parameter Number) — informational unit of S6. Each SPN has determined name, number, extension, data type and numerical value. The following types of SPN exist: Parameters, Counters, Events. SPN can have a qualifier which allows qualification of parameter's value (e.g. – Onboard power supply limit/Minimum).

Telematics system — complex solution for vehicle monitoring in real time and trip analysis. The main monitored characteristics of the vehicle: Route, Fuel consumption, Working time, technical integrity, Safety. In includes On-board report, Communication channels, Telematics service ORF 4 / ORF 5.

Function module (FM) unit-embedded component of hardware and software combination, executing a group of special functions. Uses input/output PGNs and settings PGNs.

Unit is an element of vehicle on-board equipment compatible with S6 bus, which uses S6 Technology.

Introduction

Recommendations and rules set out in this Operation manual apply to **DUT-E SAU Fuel supply automation unit** (further on — DUT-E SAU) manufactured by Technoton company.

This document contains information on the purpose, principle of operation, design and specifications, as well as recommendations regarding DUT-E SAU connection, configuration and operation.

DUT-E SAU **— intellectual device operating independently or within the Telematics system in combination with DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor; according to its readings, it automatically controls fuel supply from the auxiliary tank to the main service tank of the consumer.**

DUT-E SAU key features:

- it is developed based on IoT Burger Technology — internal automatic processing and analysis of readings of a connected fuel level sensor, in accordance with the specialized profile of settings recorded into the non-volatile memory;
- intuitive service software, simple configuration of limits for "maximum" and "minimum" fuel levels;
- controlling operation of any types of fuel pumps with rated power supply voltage 12 V / 24 V;
- conformity with S6 Technology — full compatibility with all types of fuel level sensors using CAN j1939/S6 interface, other Units, S6 Database and S6 cable system;
- mounting holder for fixing the unit on a standard DIN rail (mounting kit);
- two hermetic cable inputs for separate connection of power circuits and logic circuits are provided (one for power supply and control of the pump, the other — for connection by means of S6 Technology);
- enhanced dust and moisture protection of the casing (IP66) and a wide range of operating temperatures — suitable for hard service conditions;
- compliance with international standards;
- high quality technical support and documentation.

See figure 1 for identification code for DUT-E SAU ordering.

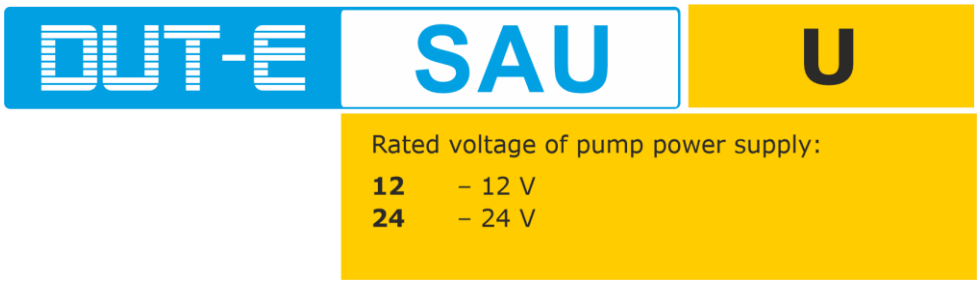


Figure 1 — DUT-E SAU order identification code

Example of DUT-E SAU ordering identification code:

"DUT-E SAU 12/24 fuel supply automation unit"
(for the pump with 24 V rated power supply voltage).

To ensure correct operation of DUT-E SAU, its connection and configuration must be carried out by certified personnel who have undergone training in the company.

For DUT-E SAU configuration using cable connection to the PC you should use S6 SK service adapter (to be purchased separately) and the Service S6 MasterCAN (version from 3.32 and higher) service software. The software current version can be downloaded at https://jv-technoton.com/, Software/Firmware.

ATTENTION: It is strongly recommended to follow strictly the instructions of the present Manual when using, mounting or maintaining DUT-E SAU.

The Manufacturer guarantees DUT-E SAU compliance with the requirements of technical regulations subject to the conditions of storage, transportation and operation set out in this Manual.

ATTENTION: Manufacturer reserves the right to modify DUT-E SAU specifications that do not lead to a deterioration of the consumer qualities without prior customer notice.

1 General information and technical specifications

1.1 Purpose of use and application area, operation principle

DUT-E SAU **— is designed for automatic control of fuel supply from the auxiliary tank to the main service tank, in accordance with data on fuel level in the main tank (SPN 96) received via CAN j1939/S6 interface (see figure 2).**

Figure 2 — DUT-E SAU purposes of use

Application areas:

1) Basic application of DUT-E SAU — automation of uninterrupted fuel supply in Diesel generator units (DG) / Diesel power plants (DPP), including their operation within the Telematics system.
2) Automated uninterrupted fuel supply in boiler plants using liquid fuel, in systems of industrial Internet of Things (IIoT), "smart home", "smart factory" and so on.

Operating principle:

CAN j1939/S6 input interface of DUT-E SAU automation module is connected by means of S6 Technology to DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor which is mounted in the main tank of the consumer. The wires of DUT-E SAU control cable are connected to the disruption in the switching circuit for switching on/off the fuel pump supplying fuel from the auxiliary tank to the main consumer tank (see figure 3).
DUT-E SAU receives and analyzes current data on fuel level (SPN 96) in the non-stop mode, in accordance with user settings. In case the fuel level value in the main tank drops to the minimum (10 %), the contacts of DUT-E SAU control relay are automatically locked and the pump supplying fuel from the auxiliary tank to the main tank is switched on. As soon as the maximum fuel level is reached in the main tank (85.2 %), the control relay contacts are automatically opened and the pump is switched off.

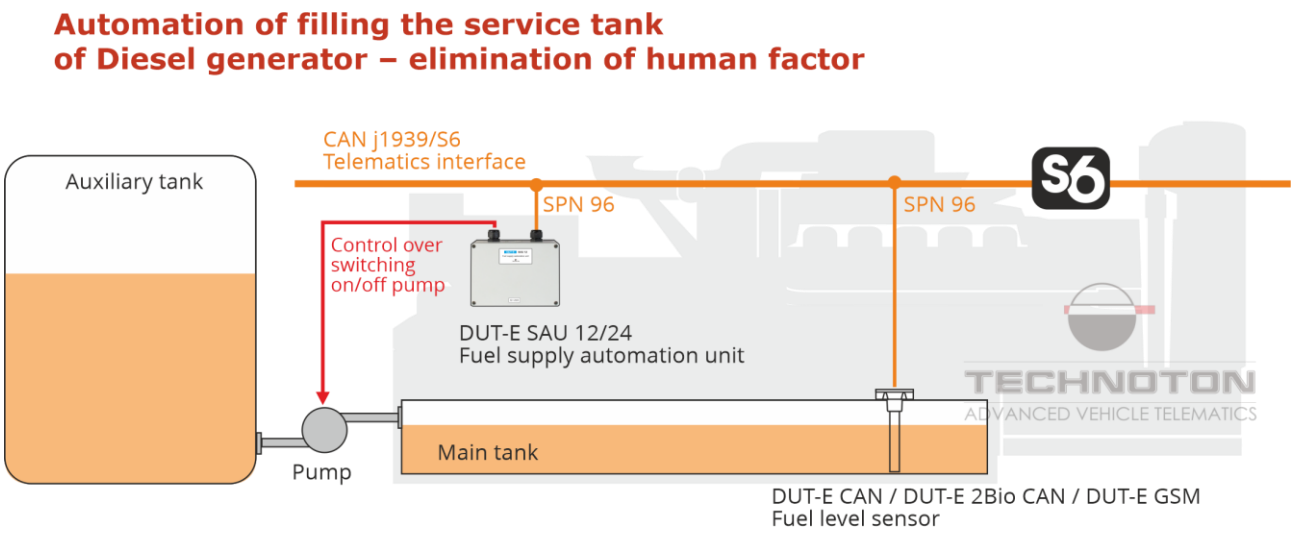
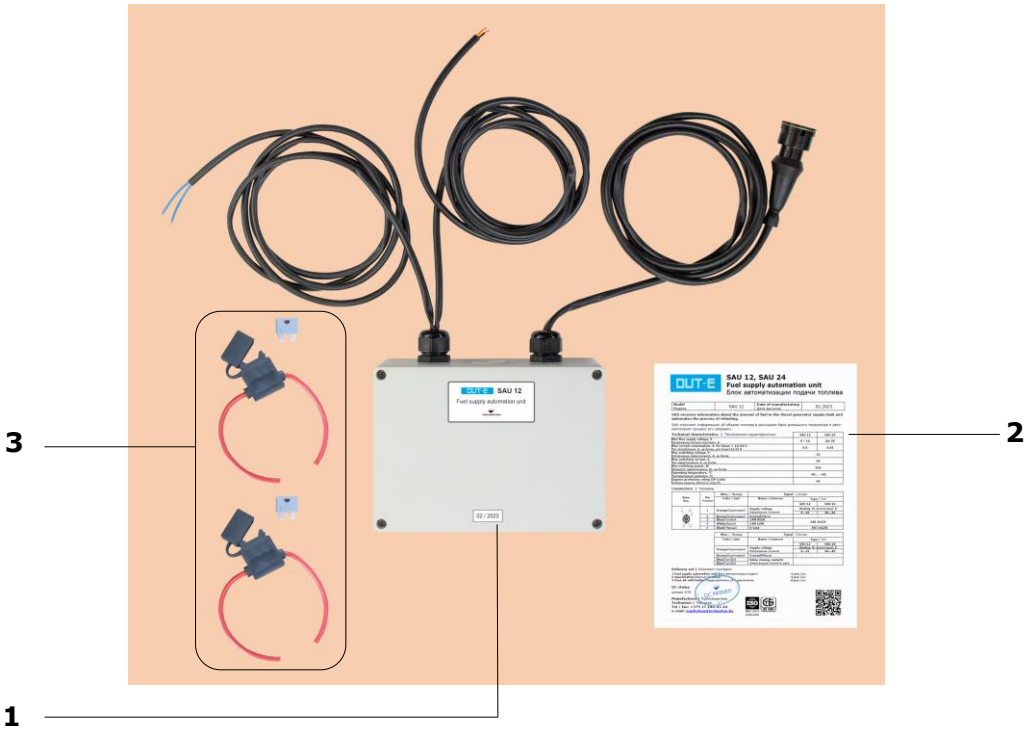


Figure 3 — Example of DUT-E SAU application for automatic uninterrupted fuel supply of DG

Employment of DUT-E SAU automation module provides the solution for:

- ensuring continuous uninterrupted fuel consumer operation;
- elimination of the need for manual control;
- protection from fuel theft during fuel pumping.

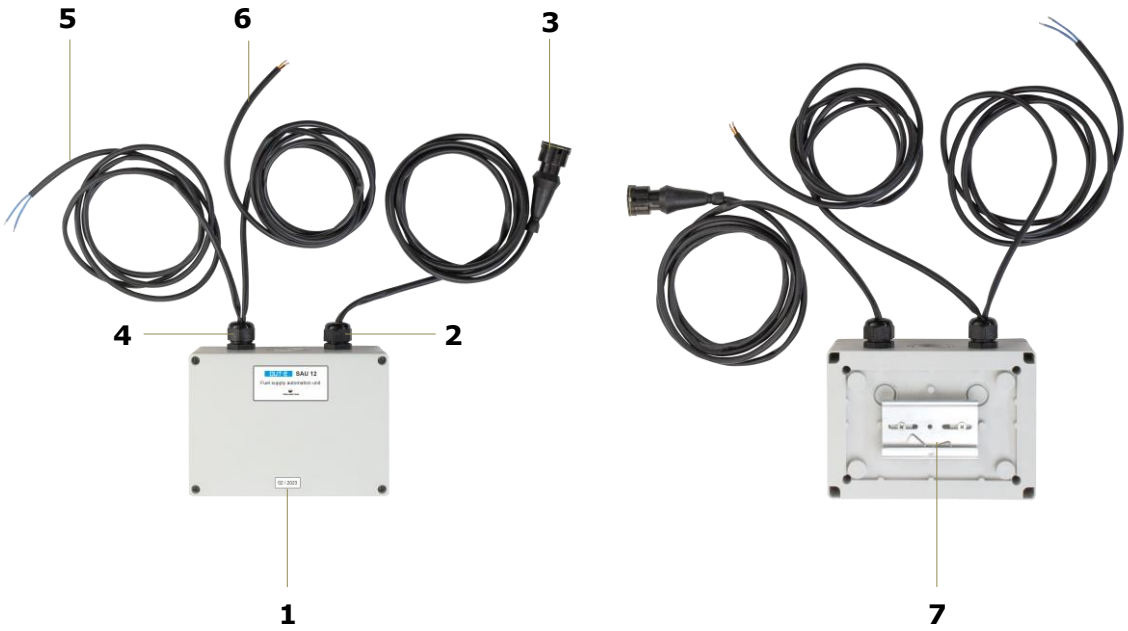
1.2 Delivery set



1 - DUT-E SAU fuel supply automation unit – 1 pc.;
2 - passport sheet – 1 pc.;
3 - fuse with holder (2 A) – 2 pcs.

Figure 4 — DUT-E SAU delivery set

1.3 External view and design



a) top view *b) bottom view*

1 Casing of DUT-E SAU 12/24 fuel supply automation module inside which there is a control relay and Master CAN DAC15 digital to analog converter with the specialized profile of settings recorded into the internal non-volatile memory.

2 Hermetic cable input to connect to logic circuits.

3 S6 cable for:
- DUT-E SAU connection by means of S6 Technology to DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor;
- connection of DUT-E SAU power supply;
- DUT-E SAU configuration via K-Line interface (ISO 14230) using S6 SK service adapter.

4 Hermetic cable input for connection of power circuits.

5 Control cable serves for connection into the disruption of the switching circuit controlling switching on/off the fuel supply pump.

6 Power supply cable for connection of DUT-E SAU power supply or for transit power supply for external devices.

7 Mounting holder for fixing DUT-E SAU on the DIN rail (see figure 6 b).

Figure 5 — DUT-E SAU external view and design

1.4 Technical specifications

Power supply for DUT-E SAU is provided from an external power source, e.g. onboard circuit of a Diesel generator.

1.4.1 Main specifications

Table 1 — DUT-E SAU main specifications

Parameter, measuring unit	Value	
	DUT-E SAU 12	DUT-E SAU 24
Voltage range of external power supply, V	9…16	20…29
Consumed current at rated voltage 12/24 V of power supply, mA, not more than	0.9	0.45
Switching voltage, V, not more than	30	
Switching current, A, not more than	40	
Switching power, W, not more than	560	
Temperature range, °C	-40…+85	
Level of sealing protection from dust and moisture	IP66	
Input interface	CAN j1939/S6	
Service interface	K-Line (ISO 14230)	
Weight, kg, not more than	1.3	
Overall dimensions, mm, not more than	see figure 6 a	

1.4.2 Specifications of CAN j1939/S6 input interface

CAN j1939/S6 input interface of DUT-E SAU fuel supply automation module is designed to receive readings of DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor which are transferred in SPN 96 "Fuel level 1" (FMS-message PGN 65276 (0xFEFC) "Dashboard display" (rules of output — 1000 ms)).

Specifications of CAN j1939/S6 comply with S6 Technology. The data transfer protocol is based on SAE j1939 standard and meets its requirements. Data exchange is conducted automatically or upon request.

Baudrates for DUT-E SAU and for the fuel level sensor operating in combination with it must be specified the same from the range of fixed values: 100; 125; 250; 500; 1000 kbit/s (by default — 250 kbit/s).

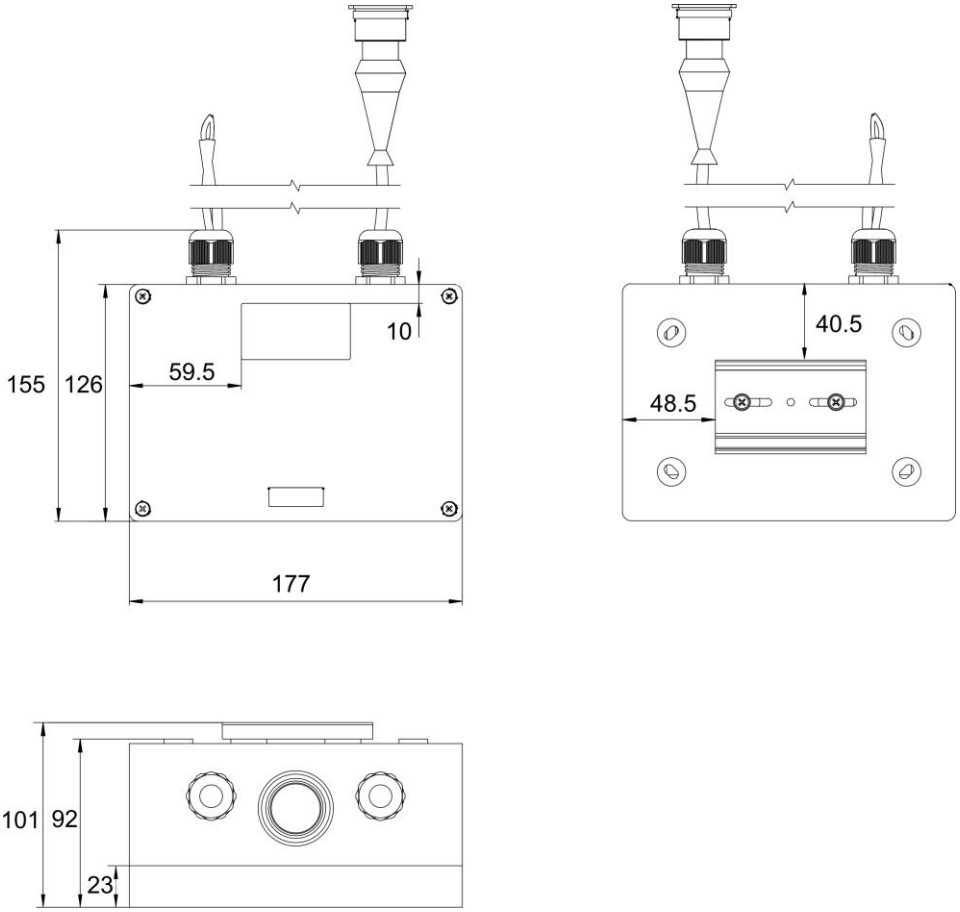
For DUT-E SAU, a unique network address (SA) must be specified: 126 or 146 (by default — 126), while the address of the fuel level sensor operating in combination with it must be specified from the ranges: basic — 101…108 (by default — 101) and additional — 91…98.

User configuration of DUT-E SAU connection via CAN j1939/S6 interface is conducted by means of K-Line interface (ISO 14230) with the help of Service S6 MasterCAN software (versions from 3.32 and higher) (see 2.3.5). The current version of the software can be downloaded at https://jv-technoton.com/, section Software/Firmware.

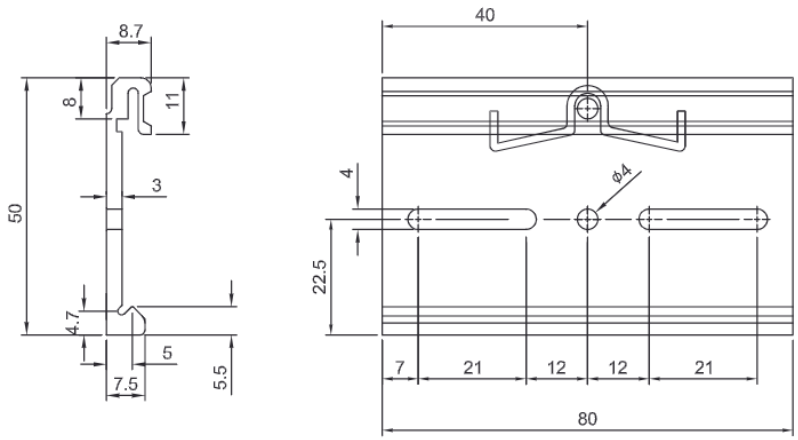
The description of connection configuration via CAN j1939/S6 interface for DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM is provided in the operation manual of the respective sensor.

IMPORTANT: The obligatory condition for correct data transfer between DUT-E SAU and the fuel level sensor via CAN j1939/S6 interface is the availability of two **120 Ohm** terminal resistors at both ends of CAN 2.0B (SAE j1939) communication line, between CAN LOW and CAN HIGH wires (see figure 16).

1.4.3 Overall dimensions



a) DUT-E SAU 12/24 fuel supply automation unit



b) mounting holder for fixing on DIN rail

Figure 6 — Overall dimensions

2 DUT-E SAU installation

ATTENTION:
1) When mounting DUT-E SAU, strictly follow safety rules of car repair works as well as local safety rules of the customer' company.
2) Before you start connecting DUT-E SAU, please, study carefully the electric equipment diagram and operation documentation of the asset to be equipped.

For DUT-E SAU correct operation its mounting and configuration should be carried out by certified specialists who have passed corporate technical training.

2.1 Exterior inspection prior to works start

It is necessary to conduct DUT-E SAU exterior inspection for the presence of the possible defects arisen during transportation, storage or careless use.

Contact the product supplier if there any defects.

2.2 Operation limitations and fixing

For DUT-E SAU mounting, you are to choose a dry location protected from the aggressive environment impact.

WARNING: DUT-E SAU **must not** be mounted:
1) Close to heating and cooling elements (e.g. climate control systems), power electric circuits.
2) Less than 10 cm from rotating mechanisms and surfaces.

For instance, the most suitable location for mounting DUT-E SAU on a Diesel generator unit is the surface of the equipment close to the unit controller.

RECOMMENDATION: **We highly recommend** to fix DUT-E SAU on a DIN rail (purchased separately) with the help of the mounting holder fixed on the bottom cover of DUT-E SAU casing (see figure 7, see dimensions in 1.4.3).

Figure 7 — Location of the mounting holder for DUT-E SAU

2.3 Configuration

The fuel supply automation module of DUT-E SAU is supplied ready for use. However, in case you need, you may change settings of DUT-E SAU that are set by default by using K-Line interface (ISO 14230) with the help of S6 SK service adapter (purchased separately). For this purpose, you should connect DUT-E SAU to the personal computer (further on — PC) using the service adapter.

ATTENTION: To avoid any service adapter faults in communication between PC and DUT-E SAU make sure there are no sources of electromagnetic enterference close to the workplace (running electric motors, welding equipment, high-power transformers, power lines, etc.).

Before connecting DUT-E SAU to PC via service adapter, please download special software from http://www.jv-technoton.com/ (section Software/Firmware) and install it to your PC:

- USB driver;
- Service S6 MasterCAN (version 3.32 and higher).

Note — Installation file of software has the view as: ServiceS6_MasterCAN_X_X_Setup.exe. X_X corresponds to the version of software.

ATTENTION: For work with Service S6 MasterCAN software, you need a separate PC (desktop or laptop) on which **only** Technoton service software that meets the following minimal requirements is installed:
- Windows 7/10 operating system of X32/X64 bit depth;
- CPU — Intel Core i3, dual-core, 2.0 GHz;
- RAM — 4 Gb;
- availability of USB 2.0 port;
- display resolution 1366x768.

Description of S6 SK and requirements for PC can be found in CAN j1939/S6 Operation manual.

Settings of DUT-E SAU displayed and/or edited using the software correspond to settings of Functional modules (FM) of Master CAN DAC15 digital to analog converter which is part of DUT-E SAU (see annex A).

2.3.1 Connecting DUT-E SAU to PC

ATTENTION: Before you perform operations of DUT-E SAU connection to the PC, you are to de-energize electric circuits of the Diesel generator (asset to be equipped). To do this, use the battery switch or remove the battery terminals.
During configuration of DUT-E SAU operating within the network of Units by means of S6 Technology it is allowed not to switch off the onboard circuit power supply (Battery).

Before starting to use service adapter, have a closer look on its elements to detect defects which can occur while service adapter was transported, stored or handled carelessly.

Avoid the following when connecting service adapter to converter, installed on the Vehicle:

- ingress of fuel and lubricants and moisture to the contact pins of adapter slots or connectors of service cables;
- potential damage of the adapter and cables by the rotating and heating elements of the engine.

DUT-E SAU connection to PC per the connection schemes (see figure 8) in the following order:

1) Connect the adapter to DUT-E SAU.

- The connector of the adapter service cable is connected to S6 cable connector of DUT-E SAU automation module through the plug connector from S6 SK delivery set (see figure 8 a).

  Note — In the process of configuration, you must provide power supply for DUT-E SAU and the adapter from the battery or any other external power source. Power is supplied through one of the free connectors of the plug connector or through power supply wires in the adapter service cable or through DUT-E SAU power supply cable.

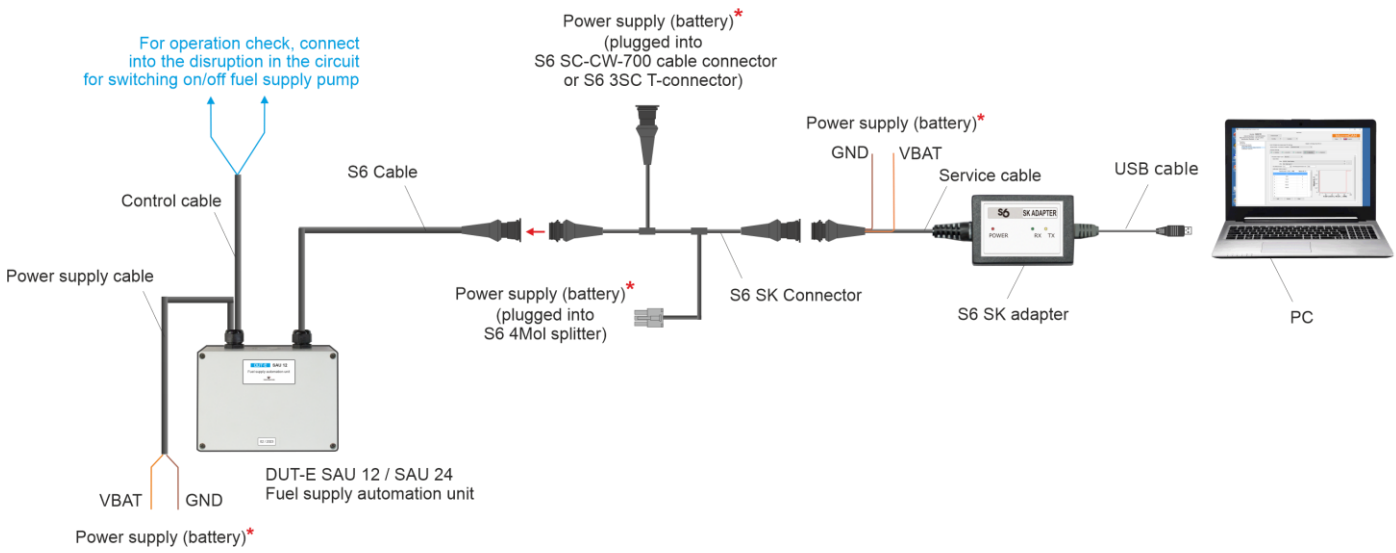
- During the configuration of DUT-E SAU operating within the network of Units by means of S6 Technology the connector of the adapter service cable may be connected into the break of S6 cable system instead of any S6 3SC T-connector. In this case, power is supplied to DUT-E SAU and the adapter through S6 cable system (see figure 8 b).

2) Connect the adapter with USB cable to a free USB-port of your PC.

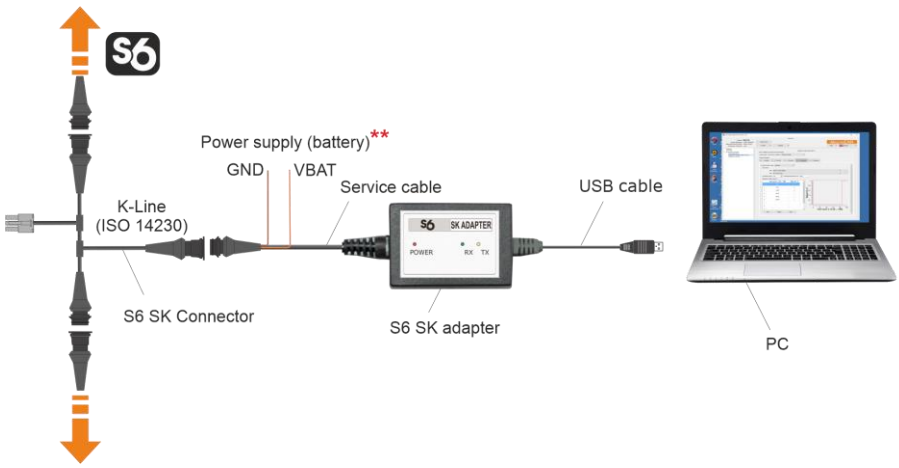
Note — Adapter can also be connected to USB-port of your PC after turning electrical system ON and starting the software.

3) Connect power supply and ground wires to electrical system or battery.

4) Switch power on (battery).



a) connection of a single DUT-E SAU with the help of S6 SK



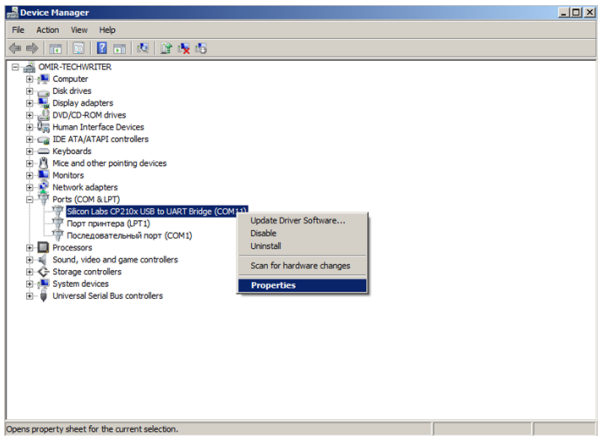
b) connection of DUT-E SAU with the help of S6 SK within the network of Units by means of S6 Technology

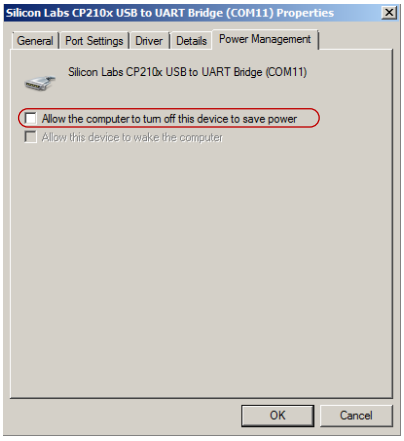
Figure 8 — Schemes of DUT-E SAU connection to PC

* For connecting power supply (battery) you can choose any of marked places.
** No need to connect. Power supply (battery) is carried out though S6 cabling system.

Windows automatically detects adapter connected to PC's USB port as USB device and enables virtual COM port driver for it. The virtual COM port will be displayed in the list of ports of Windows Device manager (see figure 9).

ATTENTION: It is recommended to untick power save check box for Service S6 MasterCAN in the virtual COM-port properties for energy safety purpose (see figure 9 b).





a) selecting port properties *b) disabling power save option*

Figure 9 — Virtual COM-port configuration in Device manager

S6 SK is ready to use since the power is on. See table 2 for signal description of LED indicators located on the adapter.

Table 2 – Adapter LED signals description

LED Indicator			Signal description
Marking	**Status**	**Light color**	
POWER		Red	Power supply is on
	No signal		Power supply is off (or voltage is less than minimum required)
RX		Green	DUT-E SAU data is being received
	No signal		No data from DUT-E SAU
TX		Yellow	Data is being transmitted to DUT-E SAU
	No signal		No data to DUT-E SAU

2.3.2 Interface of software

Service S6 MasterCAN software is launched with desktop shortcut created during installation. Software interface consists of **Horizontal menu**, **Vertical menu, Unit ID area** and **Information and Configuration area** (see figure 10).

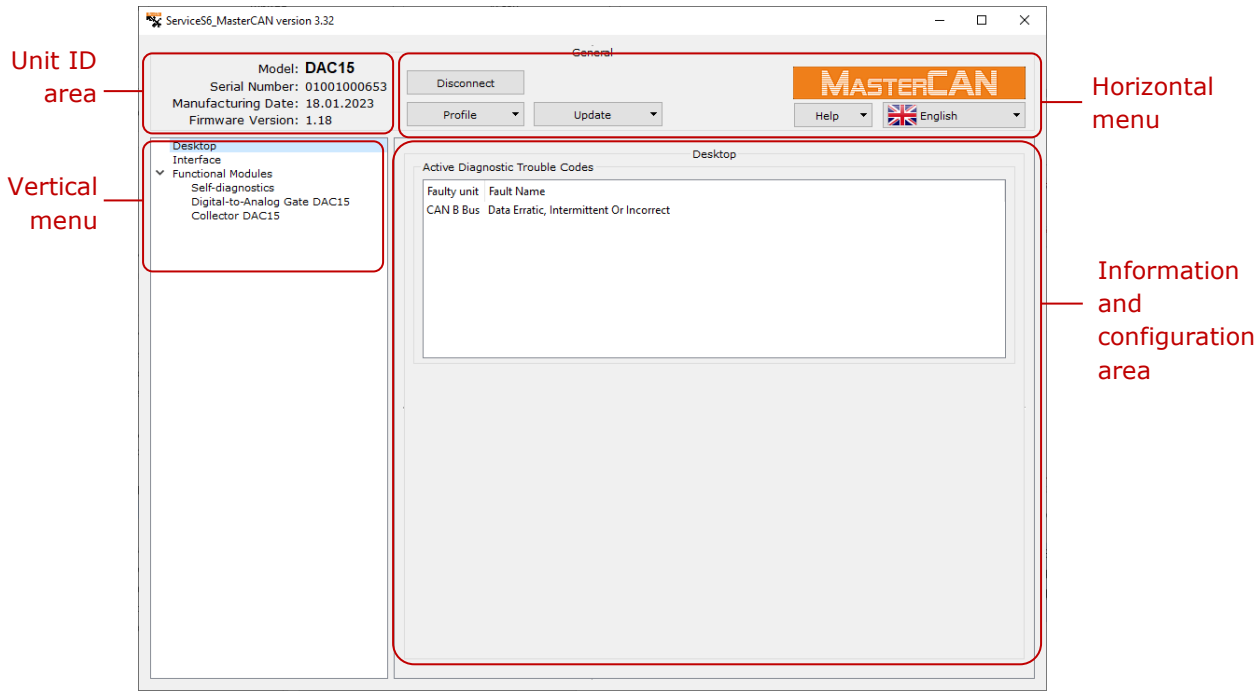


Figure 10 — Interface of Service S6 MasterCAN software

ATTENTION: At lower screen resolutions (less than 1024x768) Service S6 MasterCAN window is automatically set to full screen. In this case scroll bars are used to display unseen areas.

Unit ID area provides information about the model, serial number, manufacturing date and firmware version of the connected converter.

Horizontal menu provides the following:

- connection/disconnection of the DUT-E SAU;
- profile options (loading profile, saving profile, printing profile);
- updating firmware;
- S6 Database update in the service software (in case the PC has Internet access);
- selection of interface language;
- viewing help file and information about the utility.

Vertical menu is used to select Functional modules (FM) of Master CAN DAC15 digital to analog converter included into DUT-E SAU. Current parameters and settings of FM are displayed in **Information and settings** area. During work with the FM of the converter, Service S6 software of MasterCAN operates data (PGN and SPN) from **S6 Database** (see annex A).

The detailed description of S6 Database can be found in the web-page http://s6.jv-technoton.com/ part S6 Data base. To update S6 database in Service S6 MasterCAN software via Internet, use DB S6 button in the dropdown menu Update.

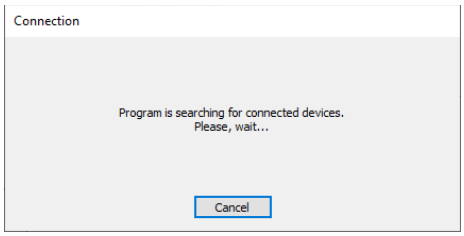
Information and Configuration area displays names (PGN) and parameters (SPN) of the messages. Each SPN holds the following: data range, discretion, measuring units.

2.3.3 Authorization

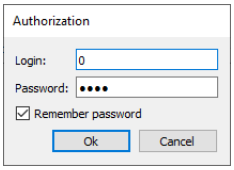
In order to establish a communication session between DUT-E SAU and the PC, press Connect button in **Horizontal menu** (see figure 10). Service S6 software of MasterCAN will search for Units connected to the PC.

When connecting the service adapter by means of S6 Technology to the network comprising several Units, select the Unit which will be used during your work with the software from the list in the window **Connection** of Unit and press Connect button.

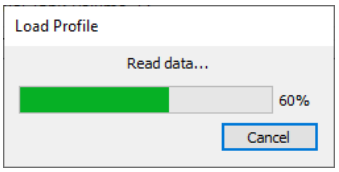
Enter Login and Password of the Unit into the appropriate fields of **Autorization** window. The default **Login** is **0**. The default **Password** is **1111**. To save a new Password (to avoid entering the password again during connection next time), tick **Remember Password** (see figure 11).



a) search for the connected Unit to PC



b) user authorization



c) Unit's profile loading

Figure 11 — Enable connection between the DUT-E SAU and PC

To recover the password (in case it is lost) you need to place the cursor into the **Login** or the **Password** field of the window **Authorization** and press **Ctrl+F10** key combination. Service S6 MasterCAN software will display a code to recover the current password of the Unit (see figure 12). This message is being sent to Technoton technical department by e-mail support@jv-technoton.com together with password recovery request.

Requirements for converter password request:

- scan copy of the request signed and selaed by the official representative of the company the Unit been purchased by should be attached;
- request should contain serial number and manufacturer date of the Unit;
- email should contain full name and contact e-mail of a person who should receive the recovered password.

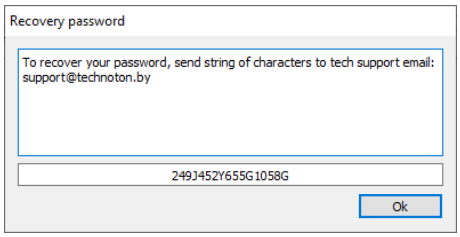


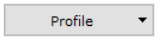
Figure 12 — Generating DUT-E SAU password recovery code

In case of incorrect Login and Password or incorrect connection to PC the warning error message will appear.

If the authorization has passed successfully, **Desktop** window will be loaded automatically, during the software loading (see figure 10); in this window, settings of Functional modules of Master CAN DAC15 digital to analog converter which is part of the connected DUT-E SAU will be displayed (see annex A).

2.3.4 Operations with profile

Profile is a set of PGN (passport data, Counters and settings of Functional modules) of Master CAN DAC15 digital to analog converter incorporated into DUT-E SAU.

It is possible to manage the profiles in both the DUT-E SAU connected and autonomous mode. The button 

with drop down menu is used to choose the options (see figure 13). Profile can be stored as a file to PC hard drive or loaded into the memory, or, if necessary, printed or saved in pdf file.

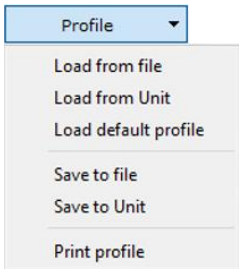
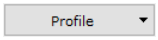


*Figure 13 — View of **Profile** menu*

Drop-down menu 

is divided into the following sections:

1) Load profile. The following options of profile loading are available in Service S6 MasterCAN software:

- Load from file — for loading of previously saved profile from the hard drive or removable disk. In the window for loading the file you are to find and select the profile file (**MasterCAN_DAC15_*.prf**) on the disc.
- Load profile from Unit — is used for loading profile from the connected DUT-E SAU.
- Load default profile — is used for loading profile with default factory settings. With this profile, it is possible to study utility operation without real DUT-E SAU connection. Profile is saved in the file **MasterCAN_DAC15_SAU_default.prf** in the folder of installation file ServiceS6_MasterCAN.exe.

ATTENTION: In autonomous mode only default profile or previously saved profile is available for loading.

2) Saving profile. Service S6 MasterCAN software has following profile saving options:

- Save to file — for saving profile to the hard drive or removable disk. This option is available only for profile loaded from file or Unit.
  In the window that opens, select the location on the disc and assign the Profile file name to the file, in accordance with the template (**MasterCAN_DAC15_*.prf)**.
- Save to unit — is used for saving modified settings into profile of the connected Unit. It is available only during the time when there an active connection between PC and DUT-E SAU.

***** Any name specified by the user. The prefix **MasterCAN_DAC15_** and **.prf** extension are inserted automatically into the file name.

If the modified settings were not saved into Unit and Disconnect button was pressed or Service S6 MasterCAN software is being closed there will appear a notification on profile settings saving. Pressing Yes will save all the unsaved parameters and converter settings.

3) Print Profile. Profile file can be saved on a PC disk in **.pdf** format for later printing or viewing on the display. File name automatically generates converter serial number and date when file was created.

RECOMMENDATION: It is recommended to attach the hardcopy of the profile to DUT-E SAU specification to log the history of the settings and configurations.

2.3.5 Settings for connection via CAN j1939/S6 interface

To connect DUT-E SAU to DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor by means of S6 Technology, you can configure the following parameters of CAN j1939/S6 interface in **Interface** submenu of Service S6 MasterCAN software (see figure 14):

1) In the field **CAN Protocol Type** (SPN 521530) **SAE 1939+S6** data transfer protocol is specified.

2) For the DUT-E SAU identification within the network of several Units connected by means of S6 Technology, select the unique DUT-E SAU network address in the dropdown list **S6 Address (SA)** (SPN 521188) from the range of fixed values: **126** or **146** (by default — **126**).

Note — You can also change the DUT-E SAU network address in the settings of Self-diagnostics FM submenu.

3) From the dropdown list **CAN Baudrate** (SPN 521531) select the required Baudrate from the following range of fixed values: **100**; **125**; **250**; **500**; **1000 kbit/s** (by default — **250 kbit/s**).

IMPORTANT: Baudrates for DUT-E SAU and for the fuel level sensor operating together with it must be specified the same.

4) From the dropdown list **CAN Mode** select the required mode of data reception in CAN j1939/S6 interface:

- **Active (CAN Requests Enable)** — DUT-E SAU generates active requests to Units connected by means of S6 Technology. Active requests are needed to receive data from PGN provided upon request.
- **Silent (Sniffer)** — DUT-E SAU is not identified by its network address by other Units. The data are received in the sniffer mode.

5) In the field **PGN Receive Timeout, s** (SPN 521532) enter the maximum time (**5 s** by default) during which absence of input PGN selected for conversion into discrete signals is allowed. In case the timeout of waiting is exceeded, the FM Self-diagnostics will produce a message of CAN communication line error.

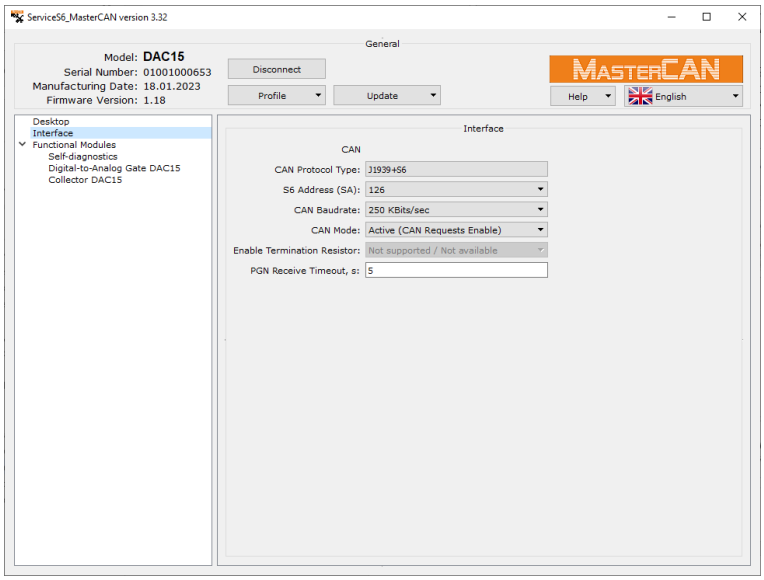


Figure 14 — Example of the window for configuration of DUT-E SAU connection parameters via CAN j1939/S6 interface

2.3.6 Settings of fuel supply automation

Configuration of fuel supply automation with the help of DUT-E SAU is conducted in the submenu of **Digital-to-analog gate DAC15 FM** of Service S6 MasterCAN software (see A.2).

IMPORTANT:
For correct DUT-E SAU operation in combination with DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor, before you start it, you are to configure the following settings of the sensor you are using:
1) Sensor **calibration** for minimum and maximum fuel levels in the tank **is obligatory**. You must conduct calibration for the specific type of fuel you use with subsequent saving the calibration data in the sensor internal memory.
2) Fuel tank calibration in which the sensor is mounted **is obligatory**, with subsequent recording the calibration table into the sensor internal memory.
3) In the sensor setting **Filtration interval**, you are to set the value of time equal **0 s**. This would prevent any delay during opening/locking contacts of DUT-E SAU time relay.

Note — Detailed description of these settings is provided in the operation manual of the corresponding sensor.

DUT-E SAU is supplied ready for use which is due to the specialized profile of settings recorded into the non-volatile memory of Master CAN DAC15 digital to analog converter which is incorporated into DUT-E SAU.

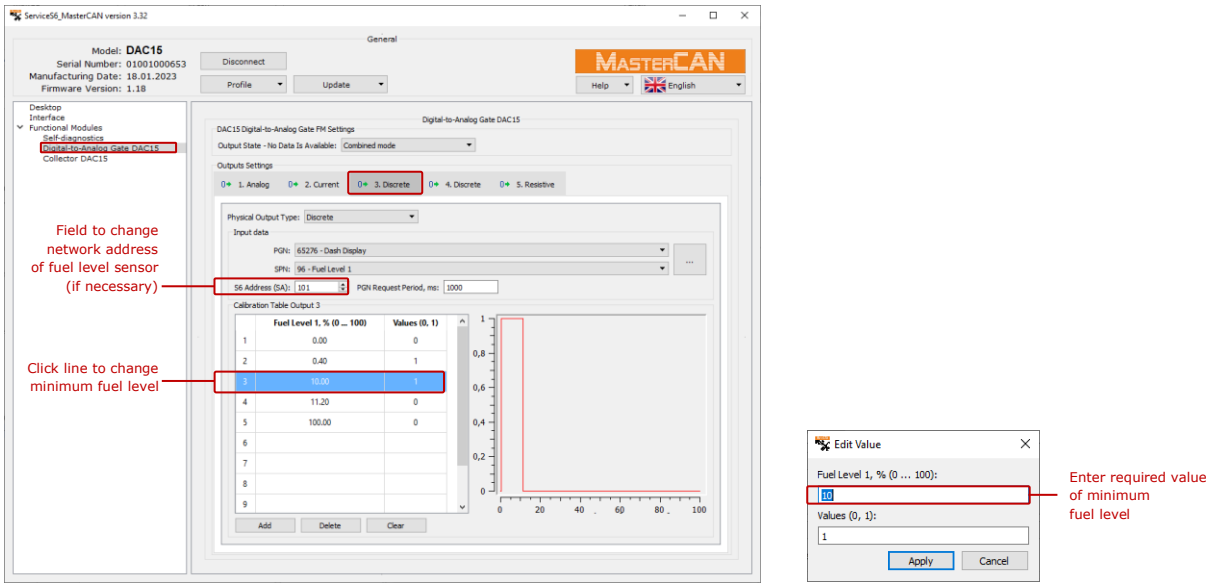
If needed, there is an option to change some of the settings specified by default (see figure 15):

1) In settings of the first discrete output of Master CAN DAC15 (3. Discrete tab in **Outputs Settings** area) you may change values of:

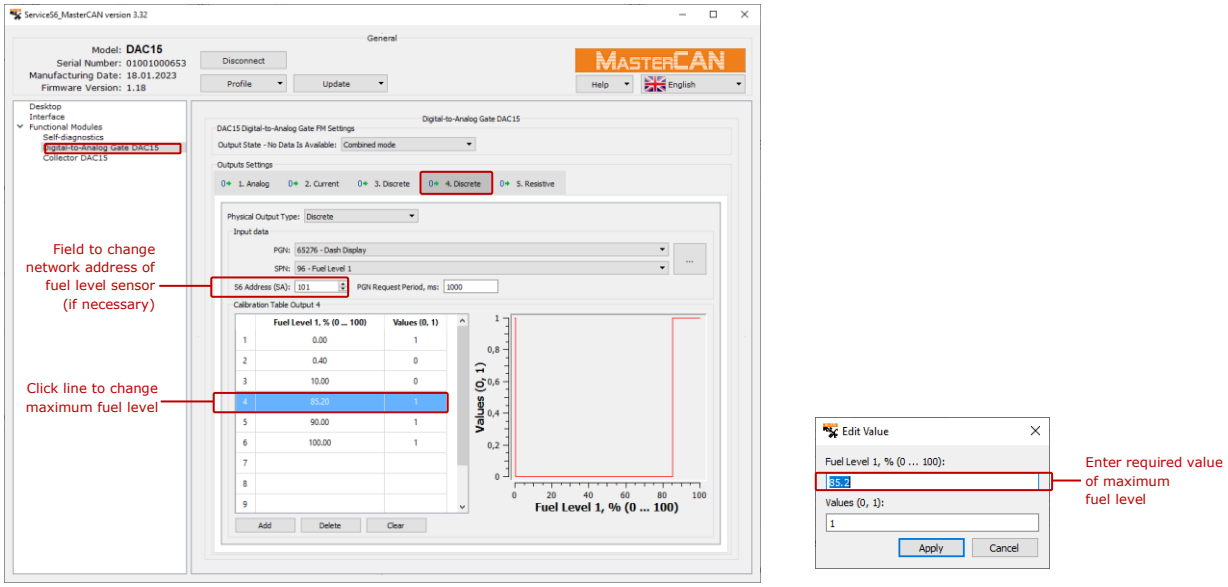
- Minimum fuel level in the main tank (**10 %** by default); as soon as it drops down to this level, DUT-E SAU automatically switches on the pump which supplies fuel from the auxiliary tank to the main service tank.
  To change the minimum level, click the corresponding line and in the opening window **Edit Value** and enter the required value in the field **Fuel level 1, %** (SPN 521347).
- Unique network address of the fuel level sensor (by default — **101**), operating in combination with DUT-E SAU.
  You may enter the required sensor address from **101…108** range in **Address in S6 (SA) bus** (SPN 521188).

2) In settings of the second discrete output of Master CAN DAC15 (4. Discrete tab in **Outputs Settings** area) you may change values of:

- Maximum fuel level in the main tank (by default — **85.20 %**); as soon as it is reached, DUT-E SAU automatically switches off the pump supplying fuel from the auxiliary tank into the main service tank.
  To change the maximum level, click the appropriate line and enter the required value in the appearing window **Edit Value** into **Fuel level 1, %** field (SPN 521347).
- Unique network address of the fuel level sensor (by default — **101**), operating in combination with DUT-E SAU.
  You may enter the required sensor address from **101…108** range in **Address in S6 (SA) bus** (SPN 521188).



a) changing the minimum fuel level in the main tank



b) changing the maximum fuel level in the main tank

Figure 15 — Example of changing DUT-E SAU default settings for fuel supply automation

2.4 Electrical connection

WARNINGS:
1) To ensure proper operation of DUT-E SAU, it should be electrically connected by specialist, who finished official technical training and was certified for that.
2) When making electrical connection DUT-E SAU it is obligatory to follow safety rules on carrying out repair works applicable to the machinery being equipped.

DUT-E SAU is powered from an external power source (e.g. onboard circuit of a Diesel generator). During DUT-E SAU operation within the network of Units by means of S6 Technology power is supplied through S6 cable system.

IMPORTANT:
1) Before connection operations, de-energize power supply electrical circuits of the asset to be equipped. During DUT-E SAU mounting on a Diesel generator, switch off the battery or release the terminals of the wires connected to the battery.
2) When connecting DUT-E SAU to the external device (Battery) we recommend to insert **fuses** (rated current 2 A) from the delivery set into power supply circuits and into ground circuits.
3) When using DUT-E SAU within the Telematics system, "+" power wire and "-" ground wire should be connected in the same points of the power supply circuit to which corresponding wires of the terminal (tracking device) are connected.
4) Before you start electrical connection operations with DUT-E SAU, you should pay special attention to the quality of grounding of the asset to be equipped ("ground"). The impedance between any point of the grounding and "-" terminal of the external power source for DUT-E SAU must not exceed **1 Ohm**.

1) DUT-E SAU is connected to the power source and to DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor by means of S6 Technology with the help of **S6 cable** (see 1.3), in accordance with the connectors contacts pinout, color and marking of wires, according to table 3.

Besides, S6 cable is also used for DUT-E SAU configuration with the help of S6 SK service adapter. For configuration of DUT-E SAU which operates using S6 Technology within the network of Units, S6 SK adapter can be connected to any free connector of S6 cable system.

Also, to connect DUT-E SAU to the power source, you may use **power cable** (see 1.3), in accordance with the color and marking of wires, according to table 4. Besides, power cable can be used for transit power supply for external devices.

2) DUT-E SAU is connected into the disruption in the switching circuit which switches on/off the fuel pump by means of the **control cable** (see 1.3), in accordance with the color and marking of wires, according to table 5.

An example of a diagram of DUT-E SAU electrical connection by means of S6 Technology for fuel supply automation, with specification of necessary components of S6 cable system, is provided in figure 16.

Table 3 — Pinout of S6 cable connector

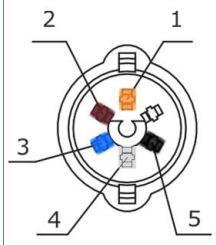
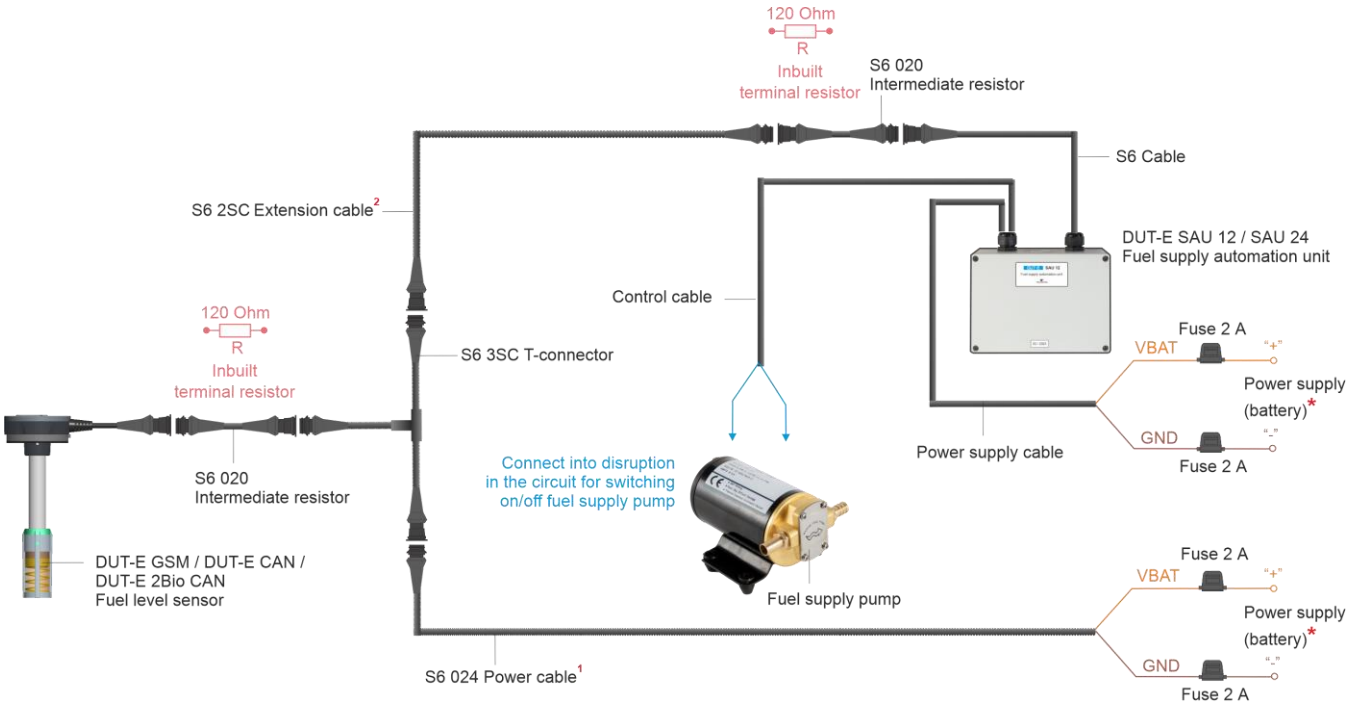
Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
	1	VBAT	Orange	Power "+"	Analog, voltage 9…16 V (for DUT-E SAU 12) 20…29 V (for DUT-E SAU 24)
	2	GND	Brown	Ground "-"	—
	3	CAN1.H	Blue	CAN HIGH	Digital, CAN 2.0B, SAE j1939 Standard
	4	CAN1.L	White	CAN LOW	
	5	KLIN	Black	K-Line*	Digital, ISO 14230 Standard
	6	—	—	Reserve	—
* Service interface for configuration and the firmware update of DUT-E SAU.					

Table 4 — Designation of power cable wires

Wire Marking	Wire Color		Circuit Designation
VBAT	Orange		Power "+"
GND	Brown		Ground "-"

Table 5 — Designation of control cable wires

Wire Marking	Wire Color		Circuit Designation
—	Blue		Locking contacts of control relay
—	Blue		



[1]Cable is included into DUT-E GSM delivery set. Length: 7.5 m. For DUT-E CAN / DUT-E 2Bio CAN purchased separately.

[2]The length is selected according to installation conditions. Standard lengths are 1, 3, 7 and 12 m.

*For connecting power supply (battery) you can choose any of marked places.

Figure 16 — Example of a diagram of DUT-E SAU connection by means of S6 Technology for fuel supply automation

IMPORTANT: **The obligatory condition** for correct data transfer via CAN j1939/S6 interface between DUT-E SAU and the fuel level sensor is the availability of two **120 Ohms** terminal resistors at both ends of CAN 2.0B (SAE j1939) communication line between CAN LOW and CAN HIGH wires.

2.5 Function test

If the configuration and connection of DUT-E SAU are performed correctly, the device starts operating from the moment the power supply is on. When the power supply is disconnected, DUT-E SAU is off.

In the process of DUT-E SAU operation, when the fuel level drops to the specified minimum level in the main service tank, the pump must automatically switch on and start pumping fuel from the auxiliary tank into the main tank.

As soon as the fuel level in the main tank reaches the maximum value specified, the pump must automatically switch off; accordingly, the pumping of fuel from the auxiliary tank into the main tank will stop.

3 Packaging

DUT-E SAU delivery set is supplied in a plastic bag. The enclosed passport sheet contains information on the name, model and the product purpose of use, electrical specifications, interface connector pinout, designation of wires, manufacturing date, QC stamp, certificates and the Manufacturer QR code.

4 Storage

DUT-E SAU is recommended to be stored in dry enclosed areas.

DUT-E SAU storage is allowed only in original packaging at temperature range from -50 to +40 °C and relative humidity up to 100 % at 25 °C.

Do not store DUT-E SAU in the same room with substances that cause metal corrosion and/or contain aggressive impurities.

DUT-E SAU shelf life must not exceed 24 months.

5 Transportation

Transportation of DUT-E SAU is recommended in closed transport that provides protection for DUT-E SAU from mechanical damage and precipitation.

When transporting by air, DUT-E SAU must be stored in heated pressurized compartments.

Air environment in transportation compartments should not contain acid, alkaline and other aggressive impurities.

Shipping containers with packed DUT-E SAU should be sealed.

6 Utilization/re-cycling

DUT-E SAU does not contain harmful substances and ingredients that are dangerous to human health and environment during and after the end of life and recycling.

DUT-E SAU does not contain precious metals in amount that should be recorded.

Contacts

Distribution, technical support and service

sales@jv-technoton.com

support@jv-technoton.com

Annex A

SPN of Functional modules

Automatic fuel supply control, configuration and self-diagnostics of DUT-E SAU are ensured by well-concerted operation of Functional modules (FM) and of Master CAN DAC15 digital to analog converter which is incorporated into it.

The format of the FM SPN complies with S6 Database (BD).

A.1 Self-diagnostics FM

Self-diagnostics FM — designed for user authorization, identification of Unit passport data, operation time recording and also active malfunctions.

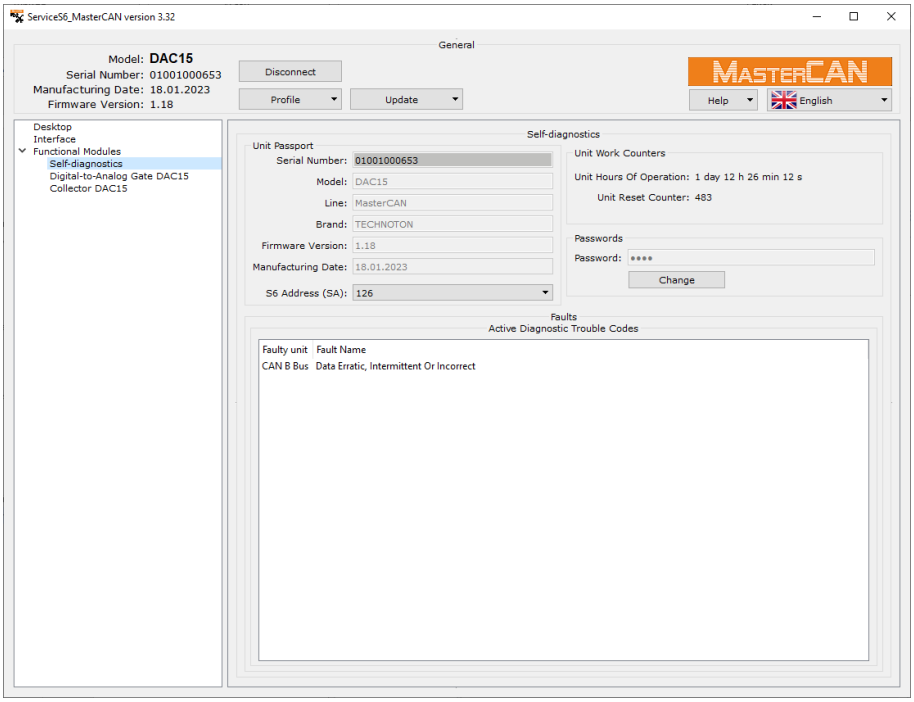


Figure A.1 — Example of the window of settings of Self-diagnostics FM in software Service S6 MasterCAN

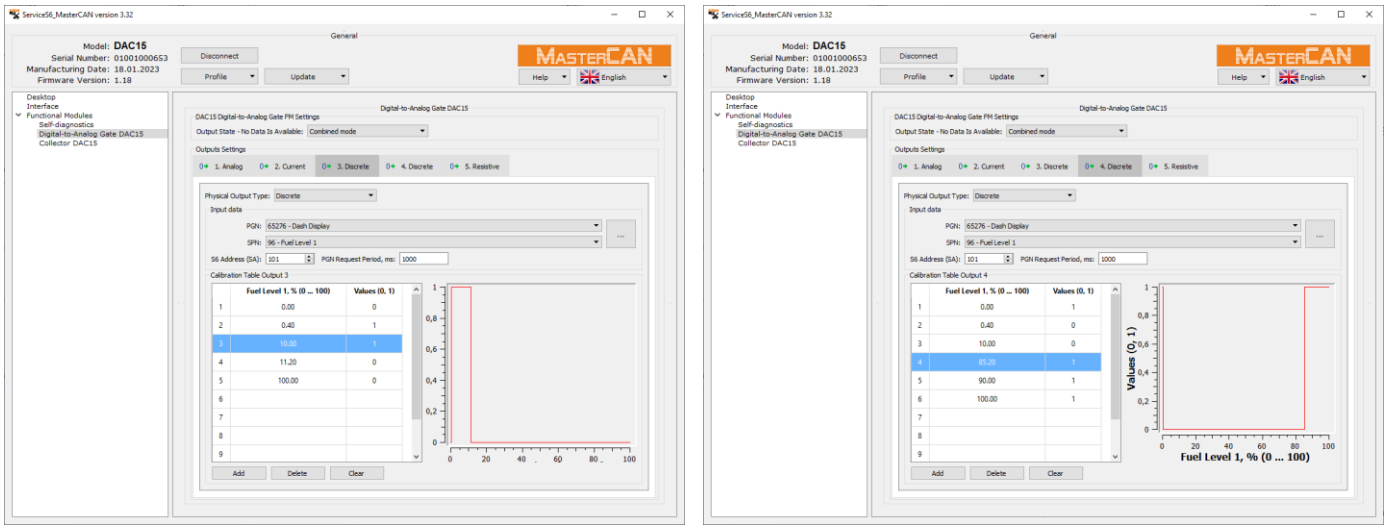
Table A.1 — Self-diagnostics FM. Displayed and/or editable SPN with the help of Service S6 MasterCAN software

SPN	Name	Factory value	Unit of measure	Clarification
Unit passport PGN 62995				
521120	Serial number	On the fact	No	Serial number is a set of numbers that is used for identification of specific Unit. MasterCAN serial number has the following format: AABBB C DDDDD, where: AA – code of converter model; BBB – digits that reflect changes product changes; C – Manufacturer code; DDDDD – sequential number. Setting is not available for editing.

SPN	Name	Factory value	Unit of measure	Clarification
521345	Model	DAC15	No	Model – this is version of the converter inside of product line MasterCAN. Each model has its own functional and constructive features. Setting is not available for editing.
521123	Line	MasterCAN	No	Name of the product line. The line represents a group of similar products – produced under general trademark MasterCAN. Setting is not available for editing.
521344	Mark	TECHNOTON	No	Name of converter Manufacturer. Setting is not available for editing.
521121	Firmware Version	On the fact	No	Version of built in Software converter. Setting is not available for editing.
521125	Date Of Production	On the fact	No	Date (day, month, year) of converter production. Setting is not available for editing.
521188	Address at S6 (SA) Bus	126	No	Network address converter which is connected via S6 Technology. Value of the network address (126 or 146) can be selected by the user.
Unit Work Counters PGN 62994				
521116	Unit Hours Of Operation	On the fact	s	Counter of converter total operation time from the moment of manufacturing. The User cannot reset this Counter himself. Only the Manufacturer or the Regional Service Center are authorized to do it.
521118	Number Of Unit Restarts	On the fact	pcs.	Counter of number of converter processor restarts, when it is switched on, or in case of impact of onboard circuit conductive interference. Number of restarts is counted from the moment of Unit manufacturing. The User cannot reset this Counter himself. Only the Manufacturer or the Regional Service Center are authorized to do it.
Passwords PGN 63017				
521593/3.3	Password/ 3.3 Installer	1111	No	Password is entered for user authorization while establishing connection session between fuel flow meter and service Software for configuring the converter. Password is a specific combination of four digits. By default used: Login – 0, password – 1111. User can change password of the converter. After entering and confirming the new password is recorded into internal memory of the converter.
Active diagnostic trouble codes PGN 65226				
521044	Fault identifier (SID+FMI)	On the fact	No	List of current converter malfunctions are displayed at the settings field (in case of its presence — up to 10). For each active malfunction is indicated following: - faulty nod; - malfunction name. This setting allows to monitor converter working performance. In case of lack of active malfunctions the following message is displayed “No malfunctions”.

A.2 Digital-to-analog gate DAC15 FM

Digital-to-analog gate DAC15 FM — is designed to receive digital messages (PGN) and also for conversion of data (SPN) into selected analog signals (voltage/frequency/current/discrete/ resistive) and their transfer to corresponding outputs.



a) settings of minimum fuel level in the main tank

b) settings of maximum fuel level in the main tank

Figure A.2 — Example of windows of settings of the Digital-to-analog gate DAC15 FM in Service S6 MasterCAN software

Table A.2 — Digital-to-analog gate DAC15 FM. Displayed and/or editable SPN with the help of Service S6 MasterCAN software

SPN	Name	Factory value	Unit of measure	Range	Clarification
DAC15 Digital-to-Analog Gate FM Settings PGN 63552					
521761	Output State - No Data Is Available	2	No	0…3	Choosing output status in case of no data (PGN) via CAN j1939/S6 interface: 0 — Output signal corresponds to value of the first point in the calibration table. 1 — Output signal corresponds to value of the last point in the calibration table. 2 — Combined mode — the output signal is changed from low to high value.
Outputs Settings (contact group O1)* PGN 63092					
521352	Output Number	No	No	0…255	Choosing Unit's contact group O1 of analog/frequency/pulse physical output.
521150	PGN	62981 Flowmeter. Parameters	No	0…65535	Specifying input data of PGN, from which SPN parameter should be chosen for analog/frequency/pulse signal conversion. PGN can be selected in Software from the priority list containing the most important Vehicle parameters or from extended list of S6 database.
1214	SPN	183 Engine Fuel Rate	No	0…524287	Selecting SPN which should be converted to analog/frequency/pulse signal from the group of parameters of specified PGN.
521188	S6 Address (SA)	0	No	0…255	Specifying network address of Unit from which selected PGN is received. If SA is 255, selected PGN will be received from any Unit of CAN j1939/S6 Telematics interface (CAN bus).

SPN	Name	Factory value	Unit of measure	Range	Clarification
521361	PGN Request Period	1000	ms	0…4294967295	Specifying period for requesting PGN from CAN j1939/S6 Telematics interface (CAN bus). If PGN is sent automatically, period is not needed, select 0 ms.
Calibration Table Output 1 (contact group O1)* PGN 63093					
521430	Physical Output Type	Frequency	V (for analog/pulse) Hz (for frequency)	10…50 (for analog/pulse) 10…10000 (for frequency)	Selecting necessary type of physical output of signal – analog/ frequency/pulse. User can also turn off the output. In this case settings of the output will not be available for configuration.
521347	SPN Value	0; 3212.75 l/h	On the fact	0…4294967295	Specifying values of converted parameters of SPN for calibration table points. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output analog signal dependence on SPN values in correspondence with calibration table.
521348	Signal Output Value	10; 10000 Hz	On the fact	0…4294967295	Specifying voltage or frequency values for calibration table of output, resulted from conversion of corresponding SPN parameters values. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output analog signal dependence on SPN values in correspondence with calibration table.
Pulse Output Settings* PGN 63210					
521274	Impulse Value	0.050000	l/h	0…4294967295	The volume of fuel that has passed the flow meter chamber and which corresponds to one its output pulse is specified. The pulse value is specified in the flow meter operation documentation.
521275	Impulse Duration	100	ms	0…64255	The value of the of the output pulse duration of the flow meter is specified. The pulse value is specified in the flow meter operation documentation.
521436	Duty Cycle	50	%	0…125	The output signal relative pulse duration value (i.e. ratio of the pulse-repetition interval to the pulse duration) of the flow meter is specified.
521276	Active Level	High	No	High/Low	Active level of output pulses based on which the flow meter calculates fuel consumption is selected.
Outputs Settings (contact group O2)* PGN 63092					
521352	Output Number	No	No	0…255	Choosing Unit's contact group O2 of current physical output.
521150	PGN	No	No	0…65535	Specifying input data of PGN, from which SPN parameter should be chosen for current signal conversion. PGN can be selected in Software from the priority list containing the most important Vehicle parameters or from extended list of S6 database.
1214	SPN	No	No	0…524287	Selecting SPN which should be converted to current signal from the group of parameters of specified PGN.
521188	S6 Address (SA)	No	No	0…255	Specifying network address of Unit from which selected PGN is received. If SA is 255, selected PGN will be received from any Unit of CAN j1939/S6 Telematics interface (CAN bus).
521361	PGN Request Period	No	ms	0…4294967295	Specifying period for requesting PGN from CAN j1939/S6 Telematics interface (CAN bus). If PGN is sent automatically, period is not needed, select 0 ms.
Calibration Table Output 2 (contact group O2)* PGN 63094					
521430	Physical Output Type	Not supported	mA	4…20	Selecting type of physical output of signal – current. User can also turn off the output. In this case settings of the output will not be available for configuration.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521347	SPN Value	No	On the fact	0…4294967295	Specifying values of converted parameters of SPN for calibration table points. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output current signal dependence on SPN values in correspondence with calibration table.
521348	Signal Output Value	No	On the fact	0…4294967295	Specifying current value for calibration table of output, resulted from conversion of corresponding SPN parameters values. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output current signal dependence on SPN values in correspondence with calibration table.
Outputs Settings (contact group O3) PGN 63092					
521352	Output Number	No	No	0…255	Contact group 03 of Unit discrete physical output is selected.
521150	PGN	65276 Dash Display	No	0…65535	Output message (PGN) to be sent from DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor operating in combination with DUT-E SAU is specified; this message contains SPN for conversion into discrete signal.
1214	SPN	96 Fuel Level 1	No	0…524287	SPN contained in output PGN of the fuel level sensor corresponding to current fuel level readings in the main tank is specified; these readings are converted into discrete signal.
521188	S6 Address (SA)	101	No	101…108	Network address of fuel level sensor from which the selected PGN is received is specified.
521361	PGN Request Period	1000	ms	0…4294967295	Period of requests for PGN reading from CAN j1939/S6 Telematics interface is specified. If PGN is sent automatically, no request is needed and the period specified is equal to 0 ms.
Calibration Table Output 3 (contact group O3) PGN 63095					
521430	Physical Output Type	Discrete	No	"0" – 0 V, "1"– voltage of power supply source	Type of signal physical input— discrete is selected.
521347	SPN Value	On the fact	%	0…4294967295	For points of output calibration table, values of the converted parameter SPN 96 corresponding to the minimum fuel level in the main tank are specified. By default, the table contains the following five points within the range of SPN change which correspond to the fuel level: 0.00 %; 0.40 %; 10.00 %; 11.20 %; 100.00 %. Graph of output discrete signal dependence on SPN values, in accordance with the calibration table, is displayed in the software.
521348	Signal Output Value	On the fact	On the fact	0…4294967295	For points of the output calibration table, values "0" and "1" of discrete signal which are received resulting from conversion of values of parameter contained in SPN 96 are specified; they correspond to the minimum fuel level in the main tank. By default, the table contains the following five points corresponding to SPN values: 0.00 % — "0"; 0.40 % — "1"; 10.00 % — "1"; 11.20 % — "0"; 100.00 % — "0". Graph of output discrete signal dependence on SPN values, in accordance with the calibration table, is displayed in the software.
Outputs Settings (contact group O4) PGN 63092					
521352	Output Number	No	No	0…255	Contact group 04 of Unit discrete physical output is selected.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521150	PGN	65276 Dash Display	No	0…65535	Output message (PGN) to be sent from DUT-E CAN / DUT-E 2Bio CAN / DUT-E GSM fuel level sensor operating in combination with DUT-E SAU is specified; this message contains SPN for conversion into discrete signal.
1214	SPN	96 Fuel Level 1	No	0…524287	SPN contained in output PGN of the fuel level sensor corresponding to current fuel level readings in the main tank is specified; these readings are converted into discrete signal.
521188	S6 Address (SA)	101	No	101…108	Network address of fuel level sensor from which the selected PGN is received is specified.
521361	PGN Request Period	1000	ms	0…4294967295	Period of requests for PGN reading from CAN j1939/S6 Telematics interface is specified. If PGN is sent automatically, no request is needed and the period specified is equal to 0 ms.
Calibration Table Output 4 (contact group O4) PGN 63096					
521430	Physical Output Type	Discrete	No	"0" – 0 V, "1"– voltage of power supply source	Type of signal physical input— discrete is selected.
521347	SPN Value	On the fact	%	0…4294967295	For points of output calibration table, values of SPN 96 parameter to be converted which correspond to the maximum fuel level in the main tank are specified. By default, the table contains the following six points within the range of SPN change which correspond to fuel level: 0.00 %; 0.40 %; 10.00 %; 85.20 %; 90.00 %; 100.00 %. Graph of output discrete signal dependence on SPN values, in accordance with the calibration table, is displayed in the software.
521348	Signal Output Value	On the fact	On the fact	0…4294967295	For points of the output calibration table, values "0" and "1" of discrete signal received resulting from conversion of values of SPN 96 parameter which correspond to the maximum fuel level in the main tank are specified. By default, the table contains the following six points corresponding to SPN values: 0.00 % — «1»; 0.40 % — «0»; 10.00 % — «0»; 85.20 % — «1»; 90.00 % — «1»; 100.00 % — «1». Graph of output discrete signal dependence on SPN values, in accordance with the calibration table, is displayed in the software.
Outputs Settings (contact group O5)* PGN 63092					
521352	Output Number	No	No	0…255	Choosing Unit's contact group O5 of resistive physical output.
521150	PGN	No	No	0…65535	Specifying input data of PGN, from which SPN parameter should be chosen for resistive signal conversion. PGN can be selected in Software from the priority list containing the most important Vehicle parameters or from extended list of S6 database.
1214	SPN	No	No	0…524287	Selecting SPN which should be converted to resistive signal from the group of parameters of specified PGN.
521188	S6 Address (SA)	No	No	0…255	Specifying network address of Unit from which selected PGN is received. If SA is 255, selected PGN will be received from any Unit of CAN j1939/S6 Telematics interface (CAN bus).
521361	PGN Request Period	No	ms	0…4294967295	Specifying period for requesting PGN from CAN j1939/S6 Telematics interface (CAN bus). If PGN is sent automatically, no request is required, select a period of 0 ms.
Calibration Table Output 5 (contact group O5)* PGN 63097					
521430	Physical Output Type	Not supported	Ohm	15…50000	Selecting type of physical output of signal – resistive. User can also turn off the output. In this case settings of the output will not be available for configuration.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521347	SPN Value	No	On the fact	0…4294967295	Specifying values of converted parameters of SPN for calibration table points. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output resistive signal dependence on SPN values in correspondence with calibration table.
521348	Signal Output Value	No	On the fact	0…4294967295	Specifying resistive value for calibration table of output, resulted from conversion of corresponding SPN parameters values. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output resistive signal dependence on SPN values in correspondence with calibration table.

— Obligatory settings needed for DUT-E SAU operation.

* These settings are irrelevant for DUT-E SAU.

A.3 Collector DAC15 FM

Collector DAC15 FM* — designed to receive an analog signal, to convert it into digital values of SPN parameters and to transfer it into CAN j1939/S6 Telematics interface.

* Settings of this Functional module are irrelevant for DUT-E SAU.

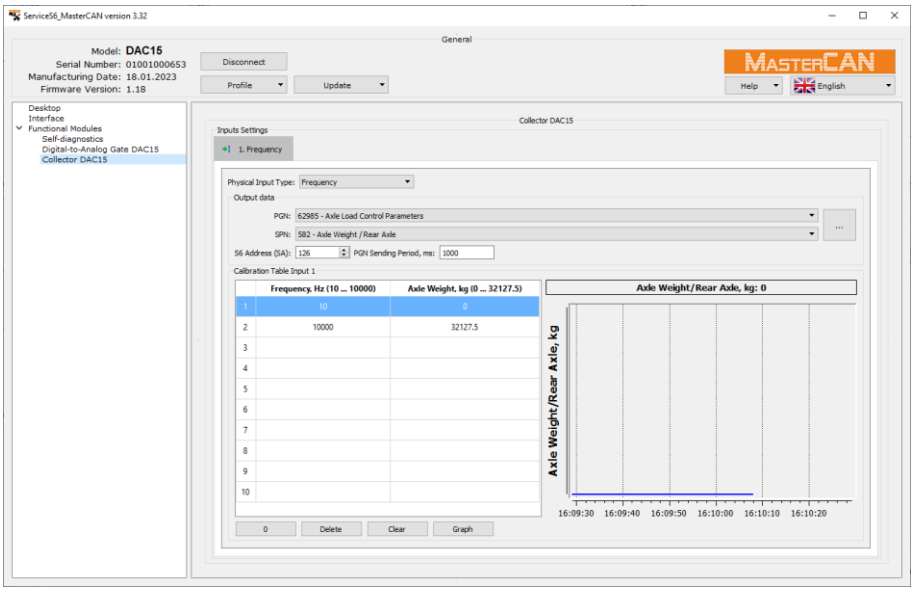


Figure A.3 — Example of windows of settings of the Collector DAC15 FM in Service S6 MasterCAN software

Table A.3 — Collector DAC15 FM.
Displayed and/or editable SPN with the help of Service S6 MasterCAN software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Inputs Settings (contact group I1) PGN 63100					
521364	Input Number	No	No	0…255	Choosing Unit's contact group I1 of resistive physical input.
521150	PGN	62985 Axle load control parameters	No	0…65535	Specifying output PGN which should include SPN converted from analog or frequency signal. PGN can be selected in Software from the priority list containing the most important Vehicle parameters or from extended list of S6 database.
1214	SPN	582 Axle weight/ Rear Axle	No	0…524287	Selecting SPN, which should be converted from analog or frequency signal.
521188	S6 Address (SA)	126	No	0…255	Specifying SA network address of Unit (MasterCAN DAC15 digital-analog converter) included in CAN j1939/S6 Telematics interface.
521362	PGN Sending Period	1000	ms	0…4294967295	Specifying time period (ms) of composed PGN transmission to CAN j1939/S6 Telematics interface. For PGN transmitted on request, time period 0ms should be selected.

SPN	Name	Factory value	Unit of measure	Range	Clarification
Calibration table input 1 (contact group I1) PGN 63101					
521365	Physical input type	Analog	V (for analog) Hz (for frequency)	10…50 (for analog) 10…10000 (for frequency)	Selecting necessary type of physical intput of signal – analog or frequency. User can also turn off the output. In this case settings of the output will not be available for configuration.
521366	Signal input value	1.54; 3.46 V	On the fact	0…4294967295	Specifying values of analog or frequency input signal for point of calibration table. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts the chart of converted parameters of SPN values dependence on values of input signal in correspondence with calibration table.
521347	SPN value	0; 10000 kg	On the fact	0…4294967295	Specifying values of converted SPN for points of calibration table. By default, the table contains two points corresponding to extreme values of range where SPN is changing. Maximum quantity of calibration points is 10. Software depicts a chart of output analog signal dependence on SPN values in correspondence with calibration table.

SPN format complies with S6 Database (BD). Detailed description of SPN, composition and contents of PGN are provided at https://s6.jv-technoton.com/ (you need to get registered for work with BD S6).

Annex B
Firmware upgrade

ATTENTION: Firmware update of Master CAN DAC15 digital to analog converter which is part of DUT-E SAU fuel supply automation module should be conducted **only** with the aim of introducing improvements recommended by the Manufacturer.

To update the converter firmware, you are to perform the following sequence of operations:

1) Connect DUT-E SAU to the PC with the help of S6 SK service adapter (see 2.3.1).

IMPORTANT: In the process of firmware update, the converter power supply voltage must not go beyond 9…16 V range (for DUT-E SAU 12) or 20…29 V (for DUT-E SAU 24).

2) After the authorization (see 2.3.3), press Unit firmware button in the dropdown menu Update.

3) Choose firmware upgrade file **(*.blf3)** on PC disk or memory stick.

4) Press Open button, that will start firmware file downloading into converter memory.

After firmware file integrity and compatibility check by Service S6 MasterCAN software window of firmware uploading into converter memory will appear. In case of any errors the Software will send warning message.

To cancel firmware upgrade it is needed to press Stop button.

WARNING: To avoid DUT-E SAU failure, before the end of the firmware upgrade process **is forbidden:**

- Power down the PC.
- Power down the DUT-E SAU.
- Disconnect DUT-E SAU from the adapter and adapter from the PC.
- Run any resource-intensive applications on the PC.

After the successful firmware update procedure, the appropriate message will appear and the software will automatically disconnect the PC from DUT-E SAU which will be operable again. During the next session of communication between the PC and DUT-E SAU the new version of the converter firmware will be displayed.

If the converter firmware update has been completed incorrectly and the current version of the inbuilt software has been damaged, the firmware update procedure has to be repeated. In this case, the inbuilt firmware loader is activated which enables to recover converter operability. If the repeated attempt fails, we recommend to consult Technoton technical support service by e-mail support@jv-technoton.com.

Annex C
Videography

Technoton useful videos are on the YouTube channel which is regularly updated:

https://www.youtube.com/channel/UCq7EF3DHrgl7fOWB2ynsR-A